TEPHRITIS MATRICARIAE (LOEW, 1844) (DIP.: TEPHRITIDAE) NEW TO BRITAIN AND BREEDING IN EAST KENT

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THE CURRENT checklist of the Diptera of the British Isles (Chandler, 1998) lists seventy-three breeding species of Tephritidae together with an additional seven occasional imports. The last resident species to be discovered from field work was in 1974 when Stubbs found *Campiglossa malaris* (Séguy) at a site near Folkestone, Kent (Stubbs, 1976) and this has now extended its range within the county (Clemons, 1992, 2000; Plant & Smith, 1996). White (1986) described *Campiglossa solidaginis* (White) as new to science on the basis of museum material from Herefordshire and elsewhere, whilst Allen (1999) recorded the capture of the exotic *Bactrocera cucurbitae* (Coquillett) at light in a suburban situation in south-east London.

On 29 April 2000, I attended a meeting of the Kent Field Club at Sandwich Bay Local Nature Reserve, the major coastal sand-dune site within the county. At about 10.45 British Summer Time, during sunny and warm conditions, two specimens of *Tephritis* were swept along a narrow strip of grassland just inside the Kent Wildlife Trust Reserve and bordering the Prince's Golf Club (Ordnance Survey grid reference TR 357592, Watsonian Vice-County 15). One of these was instantly recognised as *T. vespertina* (Loew), the commonest species of the genus throughout the British Isles, and which occurred sporadically within the site surveyed later the same day. The other, a female, was clearly different being larger and with the hyaline wing spots much more pronounced, even to the unaided eye. An attempt to identify the specimen using White (1988) placed it somewhere within the *Tephritis conura-ruralis* group on the basis of wing-pattern although the colour of the oviscape was different and a dissection of the aculeus revealed it to have a small apical notch akin to that in *vespertina*. The specimen was subsequently sent to Dr Ian White at the Natural History Museum, London who in turn referred it to Dr Bernhard Merz in Geneva. Within three weeks the specimen had been identified as *Tephritis matricariae* (Loew, 1844) and returned with a covering e-mail printout from Dr Merz. He stated "The species is quite widespread and sometimes extremely common in the Mediterranean up to central Germany, but almost absent more in the north, but it was recorded from the Netherlands by van Aartsen. Its host plant in Central Europe is probably only *Crepis taraxacifolia* which is a ruderal plant along roads; I could rear the species in the Mediterranean from some other species of *Crepis* (*foetida*, *pulchra*, *rubra*, ...)".

Armed with this information Sandwich Bay was revisited on 4 June 2000 in an attempt to find more specimens and to elucidate the host plant(s) here. Sweeping the area where the original individual had been found produced more adults of *T. vespertina* and the only fruiting Asteraceae were of *Taraxacum*, most of which were spreading their achenes and hence deemed unsuitable for collection. The first

"green" capitulum of the latter examined contained a relatively large and white dipterous larva which subsequently fell to the ground and was lost and no larvae could be found in further such capitula. A short distance northwards along the Bay, numerous plants of *Crepis vesicaria* L. spp. *taraxacifolia* (Thuill.) Thell. were present and here cautious splitting of some of the seeding capitula revealed dipterous larvae orientated head-down and parallel with the achenes. A collection of seed heads was made and, on returning home, these were spread over a layer of kitchen-roll in an open seed tray to minimise the risk of mould development. By 9 June, seven puparia had formed on the paper and these were transferred to an aerated glass tube containing a wad of tissue paper. The remainder of the capitula were placed within a plastic confectionery container. Between 22 and 24 June, nine males and seven females emerged from both sets of material, the isolated puparia eclosing first. It would appear that the larvae developing in *Crepis vesicaria* are non cecidogenous and feed on the achenes of the host-plant, pupating externally before the fruits are dispersed by the wind.

On 12 July 2000, *T. matricariae* was discovered some 19 kilometres west of Sandwich. On that date, whilst involved in a year 9 ladybird survey within the grounds of St. Anselm's Catholic School, Canterbury (TR 162561), Miss Sarah Dean presented me with a male swept from a hawthorn *Crataegus monogyna* hedge. The adjoining area had been heavily mown and no Asteraceae were visible, although evidence that suitable host-plants must grow nearby came the following day when a single female of *Dioxyna bidentis* (Rob. -Des.) (Tephritidae) was swept from the same hedge. On 26 July 2000, adults were found to be numerous at Cherry Garden Hill, near Folkestone (TR 209382). The site is largely open and grazed, south-facing chalk downland and as the species could only be found in areas where *Crepis capillaris* (L.) Wallr. was growing, it is likely that this plant is an alternative host here as in France (Séguy, 1934 as *Crepis virens* L.). On 30 July 2000, Mr Norman Heal tubed two males (one teneral) as we were recording insects at Lydden LNR near Dover (TR 286447). The latter site is also south-facing chalk downland, but with a much more rank ground flora. Again *Crepis capillaris* seemed the likely host especially as a small Diptera larva was discovered feeding on the achenes of one capitulum examined. A small collection of *Capitula* was made and on 3 and 4 August 2000 one male and one female respectively emerged. Finally, on 28 August 2000, a further female was swept from an area of chalk downland at Round Hill, Folkestone (TR 220383).

Identification

Tephritis matricariae closely resembles *T. conura* (Loew, 1844) and both species were keyed at the same number by Hendel (1927) and Séguy (1934). In Britain, *T. conura* is a northern and western species, mainly associated with *Cirsium* spp. The key to the British species of *Tephritis* by White (1988) may be modified to accommodate *matricariae* thus:

8 Crossvein r-m with adjacent small hyaline spots next to vein R4+5, but not M 8a

8a Larger; WL = 4.6-5.7mm. Posterior notopleural seta dark brown to black. Oviscape orange to dark orange, black at apex. Aculeus apex pointed..... ***conura*** (Loew)

8b Smaller; WL = 3.3-4.5mm. Posterior notopleural seta pale. Oviscape black with orange side-patches. Aculeus with an apical notch..... ***matricariae*** (Loew)

– Crossvein r-m with adjacent small hyaline spots next to both veins R4+5 and M etc. ..... ***ruralis*** (Loew)

A more detailed description based on the reared material is given below.

Head: antennae, proboscis and palpi entirely orange; upper orbits and lunule silvery-grey dusted; ocellar triangle and occiput darker grey.

Thorax: dorsum grey-dusted, covered with small pale scale-like setulae and with faint brown lines in the acrostichal, dorsocentral and intra-alar areas (distinct when viewed in sunlight); postpronotal lobe with orange ground colour; a single long black postpronotal seta; two notopleural setae, anterior long and black, posterior short, pale and scale-like becoming orange towards the base; two pairs of long, black postsutural dorsocentral setae, anterior very close to suture; presutural, anterior and posterior supra alar and intra alar setae long and black; two pairs of long, black scutellar setae, apical pair less than half length of basal pair; halteres orange.

Wings: length in male 3.3-4.3 mm (n = 10, mean = 3.67 mm), in female 3.5-4.5 mm (n = 8, mean = 3.98 mm); three hyaline spots in cell R1, two small hyaline spots at proximal and distal sides of the upper end of r-m (in some specimens there are traces of hyaline spots at the lower end of r-m); apical hyaline spot large, broadest along costa (fig. 1).

Abdomen: grey dusted, tergite 1+2 with narrow orange side patches; tergites 3-6 entirely covered with small, pale, scale-like setulae; oviscape black with broad orange side patches (fig. 2).

Legs (including coxae): orange, usually with faint dark anteroventral stripe on hind femora.

Puparium: approximately 3.4mm x 1.5mm ; entirely dark brown; cephalopharyngeal skeleton as in fig. 3.

Distribution

Tephritis matricariae is largely a Mediterranean species and Foote (1984) simply gave Southern Europe, Turkey and Egypt. Séguy (1934), on the other hand, was much more specific, listing it from Apt, Bicêtre, Cannes, Chérence, Clamart, Corse, Fontainebleau, Hyéres, Lannemezan, Marseille, Meudon, Mont-de-Marsan, Rambouillet, Royan, Saclas, Saint-Sever and Var in France and also Macedonia, Constantinople and Algeria. Van Aartsen (1992) recorded it from Colmont and

Maastricht in the Netherlands and Merz (1994) from Jura, Mittelland, Wallis and Tessin in Switzerland. In the Natural History Museum, London there are specimens from Crete: Aghii Galini, Alikiandu, Alymyrida, Georgioupolis, Geropotamos Estuary, Gonies, Kastelli, Knossus and Rodopon; Corfu: Agios Georgios, Ayia Kiriahi, Glifada, Kaiser's Throne, Lake Korission and Perouli; Corsica: Cateraggio and Etang de Dianne; France: Airaines, Barèges, Montesquien, Peyreleau, St. Paul and Veyreau; Georgia: Kazbegi; Macedonia: Prespa Geul; Montenegro: Kolasin; Morocco: Mikadane and Mouyougou; Spain: Albarracín, Huseca, Ibiza, Jaraco, Lanyaron and Zaragoza; Switzerland: Aigle.

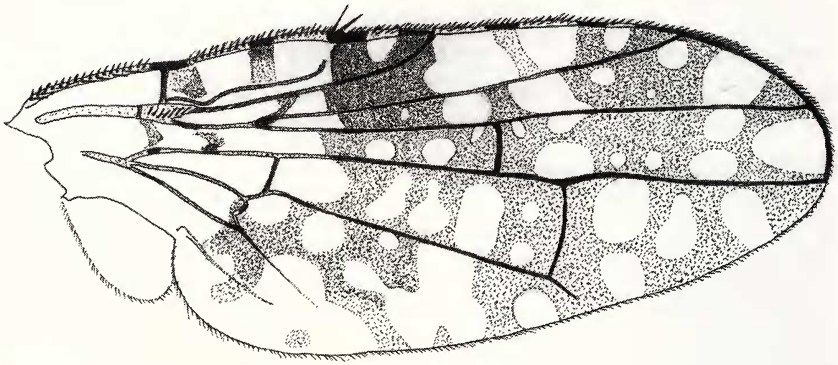

Figure 1. *Tephritis matricariae* - right wing of female.

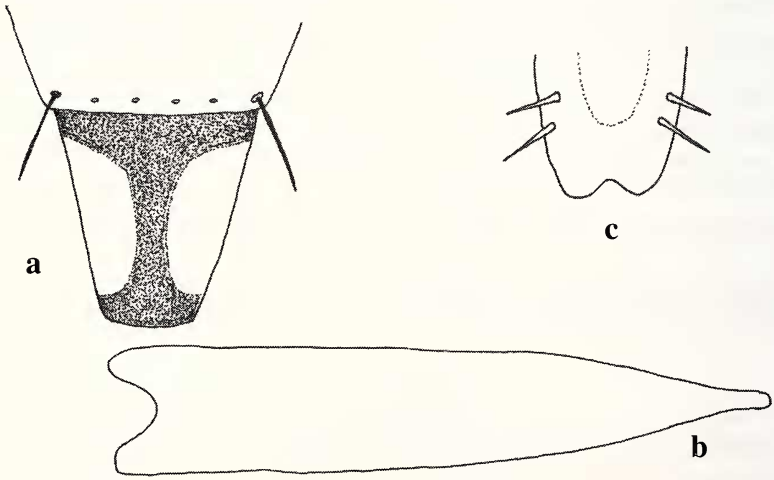

Figure 2. *Tephritis matricariae* - female post-abdomen. a: dorsal view of oviscape showing extent of orange side patches; b: dorsal view of outline of aculeus; c: dorsal view of detail of apex of aculeus.

Given the widespread distribution of *T. matricariae* in the Western Palaearctic it is not surprising that it should eventually be found in Britain although Niblett (1939) did not include it in his list of predicted additions to our fauna. Exactly when the species first arrived here must, in the absence of other records, be a matter for conjecture.

Acknowledgements

In addition to Dr. Bernhard Merz, who identified the original specimen, I am grateful to Dr. Ian White for passing on the latter and for permitting access to the collections in the Natural History Museum, London and to the Kent Wildlife Trust and the White Cliffs Countryside Project for permission to collect on land under their management. Mr. Geoffrey Kitchener advised as to the correct nomenclature of the species of *Crepis*.

Specimens of the reared material have been deposited in the collections of the British Entomological and Natural History Society at Dinton Pastures, Berkshire, in Liverpool Museum and in the Natural History Museum, South Kensington, London.

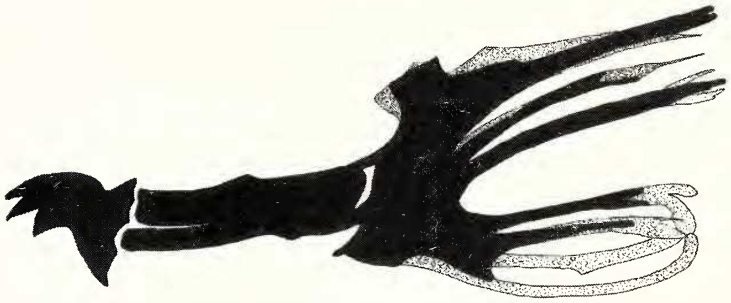

Figure 3. *Tephritis matricariae* - cephalopharyngeal skeleton from puparium.

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BOOK REVIEWS

A fly for the prosecution: How insect evidence helps solve crimes by **M. Lee Goff.** 226 pp., several line drawings in text. 237 x 160 mm., hardbound. ISBN 0 674 00220 2. Harvard University Press, 2000. £15.50.

Generally speaking I am not a great one for the personalised American style of writing, though that is just a personal preference. However, after reading the introductory chapter of Dr Goff's book I was immediately hooked. Unfortunately, work commitments prevented me from continuing the read through for several weeks until I sat down one evening to watch the television with my two offspring. The programme we were watching was concerned with forensic aspects of murder investigations. Suddenly, there on the screen before me was Dr Goff – who is Professor of Entomology at the University of Hawaii, and Consultant in Forensic Entomology to the Honolulu Medical Examiner – extolling the virtues of maggots as agents for solving the difficult problem of placing a time of death on the badly decomposed body of a murder victim. The programme was fascinating and I determined to pick up the book again. I did so the next day, and every quickly found the same case history there that had been presented on the television the night before. The few discrepancies I put down to poor video-editing!

The book is full of case-histories in which insects, in one form or another, have helped convict murderers in Hawaii. In particular, the use of insects to calculate the post-mortem interval (time lapse between death and discovery), is emphasised. The process is not simply a matter of knowing how long a particular fly larva on the body has been there. The interval is complicated by factors such as how long it takes a particular species of fly to actually find the body, and how is this period affected by seasonal temperature variation, by whether the body is naked, or completely wrapped or by other factors. In many cases, the answer to a particular problem may not be known and Dr Goff describes the experiments performed to find out. These generally tend to involve obtaining a dead pig and using it in his garden to duplicate the situation in which the body was found. And my neighbours think I am weird!

Dating decomposed bodies is not the only use of insects in forensic entomology. Maggots taken from a body can be analysed for poisons, for example. Personally, however, I particularly liked the case in which the remains of a grasshopper were found with a body. The grasshopper was missing its left hind leg; nobody gave the insect any great thought, but it was routinely collected in any event. When the suspect was caught and searched, the left hind leg of a grasshopper was found in his trouser turn-up. Microscopy showed that the fracture on leg and insect matched perfectly! The suspect was subsequently convicted.

Although somewhat autobiographical, the book is a serious attempt at enlightenment, aimed at the various law-enforcement agencies around the world that are not aware of the great benefits of forensic entomology.